

Kennedy **incremental** **magnetic** **recorders** **models** **1400**



& **1500**

- Stepper motor reliability
- Complete remote operation
- All silicon semi-conductors
- 300 step per second operation
- Binary zero to BCD 10
- Easy loading-completely visible co-planar reels
- Non-removable quick acting reel hubs
- 2½ million character capacity
- Extender card included

Kennedy

MODEL 1400



Operating upon command, the Model 1400 records information as it becomes available, a character at a time. Upon presentation of data and a write command the recorder writes a single character and advances one increment—.005" at 200 BPI. Combining high speed with extremely accurate stepping action, the 1400 writes tapes which may be used on any IBM compatible tape transport for computer input.

In addition to information, necessary gaps and marks for IBM compatibility are generated as required. These include both vertical and longitudinal parity, inter-record gaps, file gaps, file marks, etc.

Standard operating speed range is 0-300 steps per second with 0-500 steps per second available on special order.

The advantages of incremental magnetic recording over paper tape or card information handling are substantial. Not only are speeds much higher and reliability greater but costs, considering necessary conversion time for other media, are much lower.

Conventional magnetic tape recording in this speed range is normally unattractive because of expensive buffering together with the high cost of fast start-stop digital recorders.

Model 1400 offers asynchronous operation at high rates, a highly reliable, simple, mechanical drive system, compact dimensions and low cost making it the logical choice for recording applications within its range.

SYSTEM APPLICATION

In common with all Kennedy recorders the Model 1400 has been designed to be applied as readily as possible.

Data is presented to the recorder as levels on lines 1-2-4-8-A-B. Vertical parity, odd or even, is generated internally and recorded in Channel C. Data inputs may be specified as positive or negative depending upon exterior logic requirements. A write command records the data and causes the recorder to step forward one character increment. Write commands may be given at any rate up to the maximum specified speed; thus no buffering is required in most instances.

A preset block counter (external) determines record length and, at count termination signals an inter-record gap. The gap, together with longitudinal check character, is generated automatically by the recorder.

File gaps may be signalled by external logic or manually inserted by pushbutton.

Recorder control functions are brought out for remote operation together with interlock and status signals.

MACHINE CONSTRUCTION

Standard IBM 8-1/2" (1200 ft.) reels of 1/2" computer tape are used in the Model 1400. These reels make possible a compact and convenient configuration without excessive loss of data capacity.

Storage capacity without gaps is 2,880,000 characters per reel at 200 BPI and correspondingly higher at 556 BPI.

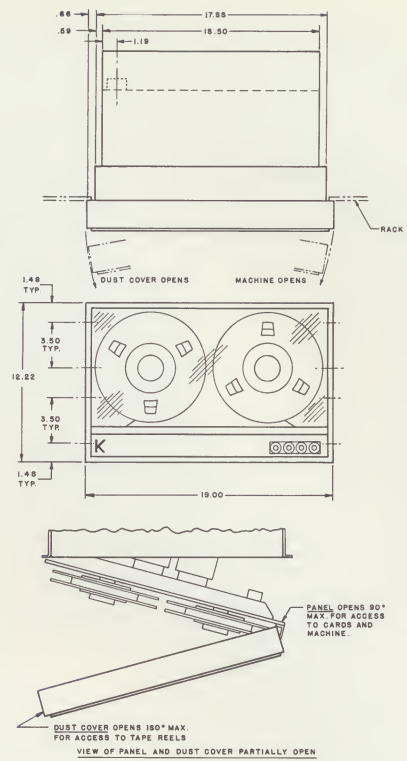
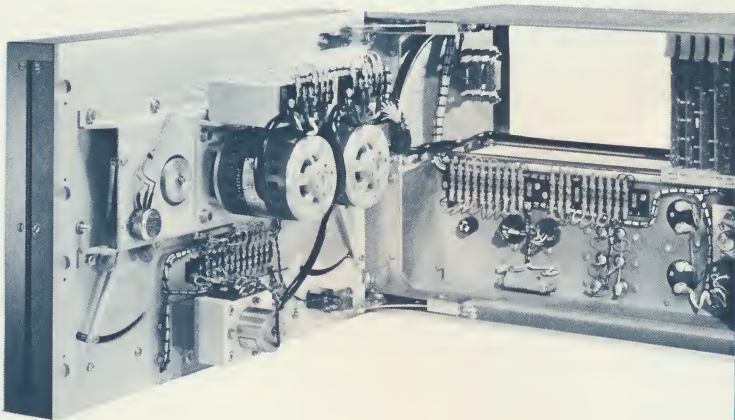
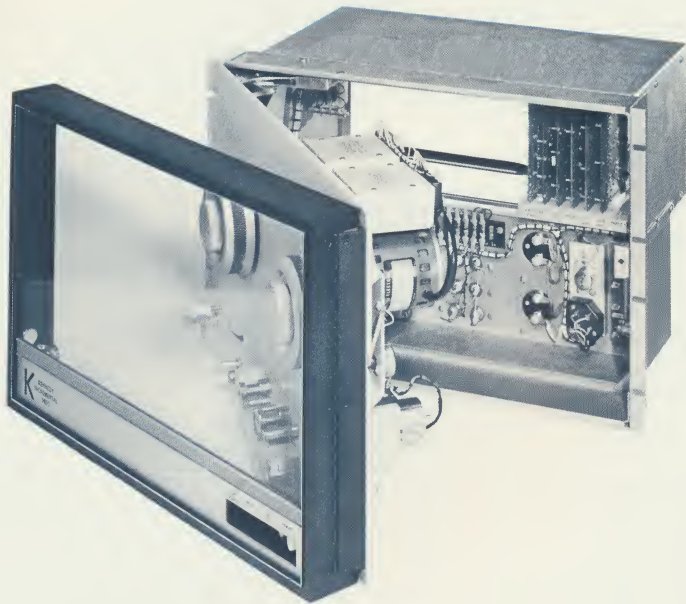
Standards of quality well known in the Kennedy DS370 have not been compromised in the 1400, but significant economies resulting from simpler design have made possible the low price. Heart of the incremental recorder, the stepper drive mechanism is identical to that used in the DS370 and other Kennedy Incremental recorders. Highly refined and absolutely reliable, this drive is the fastest, most accurate stepping mechanism available.

All silicon solid state electronics contribute to reliability. Printed circuit cards together with other vital components are accessible from the front of the unit by swinging open the front panel on special hinges.

Reels are mounted on hubs with no removable pieces in accord with standard computer practice. Reel drive is by A.C. induction motors having no brushes to wear and cause system noise. Motor torque is electronically controlled for constant tape tension.

Load Point, End of Tape and broken tape photo-electric sensing are included together with other interlock circuits. File protect switch is available as an option on write only machines and as standard equipment on Read/Write versions.

An attractively styled, gasketed dust cover is provided to protect tape from contamination.



OUTLINE MODEL 1400

CONTROLS

Four momentary pushbutton controls operate as follows:

Load-Forward—With power switch on, pressing Load-Forward energizes reels and stepper drive, causes tape to be fed forward at 1000 steps/second. In **Load** operation button is held until **Ready** light comes on, then released. Tape continues to move for 3.5 inches (min.) to produce beginning of tape gap.

If pressed at any time other than for **Load** operation, **Load-Forward** causes tape to be advanced at 1000 steps per second as long as button is depressed.

Ready—Ready light indicates the 1400 is prepared to accept data. It normally achieves this state automatically as described above. Pressing **Ready** and **Load-Forward** together will place the 1400 in the Ready condition without the presence of the Load Point Marker if desired.

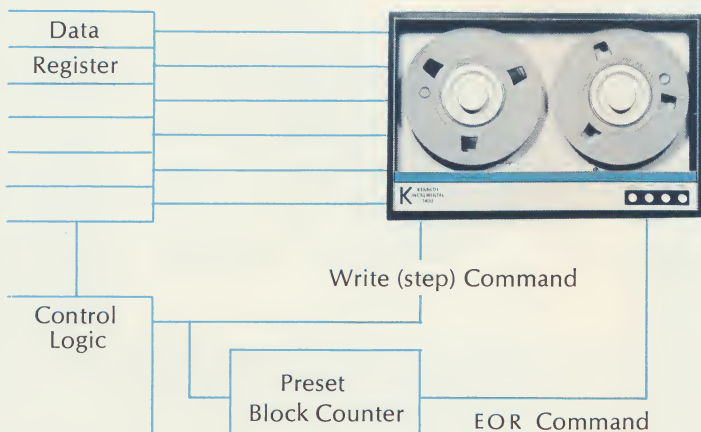
File Gap pushbutton causes a standard IBM file gap with file mark to be inserted.

Rewind pushbutton initiates rewind. Tape is rewound past Load Point and stops. Rewind time is less than 3 minutes.

Remote operation is possible by use of external connections duplicating pushbutton functions.

SPECIAL VERSIONS

While the Model 1400 is normally supplied as an incremental write only machine with 200 BPI density, other



TYPICAL DATA RECORDING SYSTEM

SPECIFICATIONS

SPECIAL OPTIONS AND FEATURES

Models 1400 and 1500 are normally supplied as described above. A number of variations and options are available, as listed below:

1. Continuous read-write @ 1000 steps/second
2. Incremental read-write (200 BPI density only)
3. 556 BPI density
4. 500 step per second operation
5. Special paint color (on cover only)
6. (Model 1500) Drawer mount
7. (Model C-1400) Available as cartridge unit using Kennedy C-11 Cartridge.
8. Flux-Check (Not available on IR)

Stepping Rate	—Zero to 300 steps/second
Skipping Rate	—1000 steps/second
Stepping Increment	—200 7 bit characters/inch
Recording Mode	—IBM compatible NRZ
Number Tracks	—IBM compatible 7 on ½ inch tape
Tape Reels	
Model 1400	—8½ inch reel IBM Standard 1200' tape capacity
Model 1500	—10½ inch reel IBM Standard 2400' tape capacity
Magnetic Tape Rewind Time	—1.5 mil mylar
Model 1400	—less than 2 min.
Model 1500	—less than 4 min.
Input Requirements	
Data Signals	—6 inputs
(Positive)	Voltage level +5V, +15V 5K ohms=1
(Negative)	Voltage level -5V, -15V 5K ohms=1
	0V - .5V = 0
	Must remain true 50 usec min. after write pulse.
Write (Step) Command	—Pulse 10 usec min. (5K ohms) +5V (-5V) Duty cycle max. 80%

Record Gap Command

Pulse +5V (-5V) 100 usec min. 5K ohms

Automatically inserts longitudinal check character. Skips ¾ inch for end-of-record gap

Record Gap Time—less than 160 msec

Gap in process signal +10V dropping to +1V max. while machine is in "Forward Mode" or during Gap Insertion

File Gap Command—pulse 100 usec min. +5V (-5V) automatically inserts longitudinal check character, skips tape 3¾ inch file gap, writes file mark with check character, skips ¾ inch gap.

Beginning of Tape Gap—Press Load Forward and Ready button simultaneously, or press Load Forward until BOT sensor is reached. 3.4 inches of tape is skipped and uniformly magnetized in accordance with IBM practice.

RECORDER OUTPUTS

End-of-tape Sensor Plus 10V level 1,000 ohms source
1 ma max. load.

Broken—Missing Tape Sensor—Plus 10V level, 1,000 ohms source

Parity—Internally generated vertical parity pulse brought out.
Positive going—10V to 0V duration app - rox. 25 usec.

OPERATING FEATURES

CONTROLS

1. Power on off
2. Load Forward
Advances tape to Load Point in loading operation. Advances tape in normal Forward operation.
3. Ready—Indicator only. Indicates machine is ready to accepts inputs.
4. File Gap—Inserts standard file gap.
5. Rewind—Releases capstan, de-energizes head current, rewinds tape past the beginning of tape marker by energizing reel servo motors. Lights indicator during rewind operation.

Remote Controls

All functions are brought out to rear connector for use with remote control.

Dimensions: 1400—19" wide x 12¼" high x 12" deep
1500—19" wide x 24½" high x 7" deep

Weight: 1400—50 lbs.
1500—65 lbs.

Power Requirements: 115V 50/60 HZ 110VA

Finish: Light gray Fed. standard 26440
Door: Flat black Instrument finish

Kennedy Co.

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1500

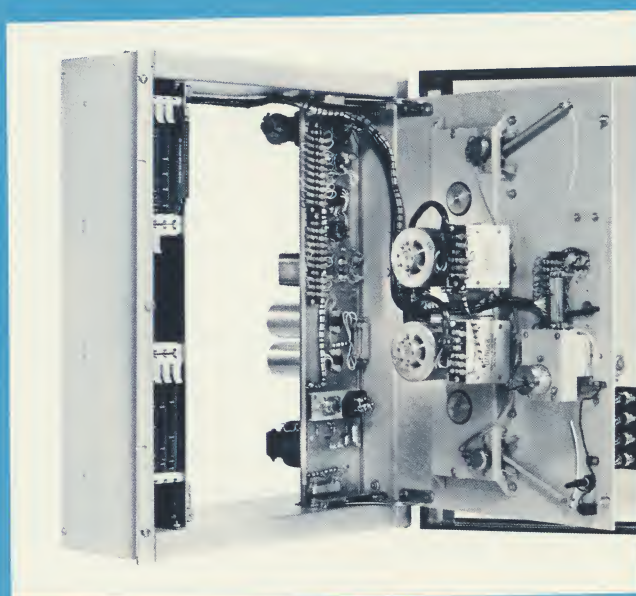
Model 1500 is identical in operation and construction to the Model 1400 except that 10-1/2 inch 2400' IBM reels are used instead of the IBM 8-1/2 inch reels in the Model 1400. Space limitations of standard 19 inch racks require that reels be positioned vertically, one above the other instead of side by side as with the Model 1400.

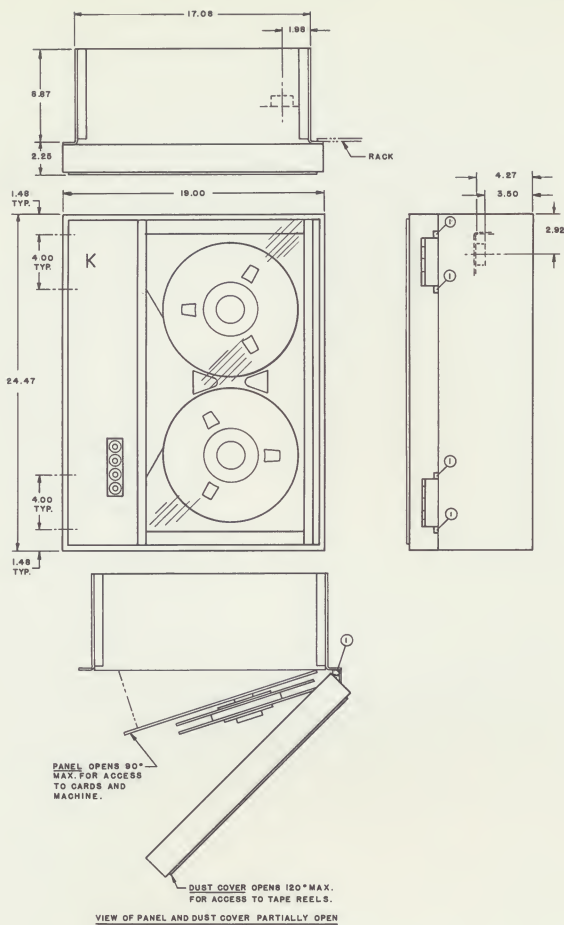
The options listed for Model 1400 are available for the 1500 with the exception of #5 interchangeability with cartridge units.

The Kennedy Model 1500 is ideal for low cost installations requiring high quality with 2400 foot tape capacity.

Conforming to highest engineering standards and construction practices, the Model 1500 is a skillfully designed, carefully made unit having all essential functions included, but with non-essential frills eliminated. This solidly built unit will give many years of satisfactory service in any data acquisition system.

Where panel space is limited the Model 1500 Drawer mount may be used. Occupying only 8-3/4 inches of rack panel, the 1500 D offers in a minimum space, the reliability of Kennedy design and construction, together with the ease of loading and unloading of coplanar reels.





OUTLINE MODEL 1500

combinations can be provided. These include:

FLUX CHECK™ operation in which each character is verified as it is recorded.

FLUX CHECK™ is not merely an echo check which determines that the electronics are functioning but a read-after-write check which instantly verifies that the character is correctly written on tape. Not available on IR.

CONTINUOUS READ/INCREMENTAL WRITE

Continuous read at 1000 characters per second with start-stop in less than 5 characters is available in addition to standard recording features. Outputs are seven data lines deskewed and clock.

INCREMENTAL READ/INCREMENTAL RECORD

Incremental Read in which tapes are read a character at a time upon command is available in the Model 1400. Asynchronous read rates up to 150 characters per second are accommodated. Record speed is 300 characters per second.

556 BPI Operation is available in record only and continuous read versions. It is not available in incremental read.

Cartridge Loading utilizing the Kennedy C-11 EIA-TS-2721 300 ft. tape cartridge is available for applications requiring the utmost in operational ease. Electrical and operational specifications are identical to the reel types except for data capacity.

GE 600 Series		RCA Spectra 70			System Identity	
340:		710:			Computer System Report No.	
DS-20	MDS-200	70/564	70/565	70/568-1	Model Number	
Dises	Drum	Dises	Drum	Magnetic cards	Type of Storage	
4/channel	1/channel	8/trunk	8/trunk	8/trunk	Units On-Line	Maximum Number
1/channel	1/channel	1/channel	1/channel	1/channel	Read/Write Operations	
1/unit	1/unit	1/unit	1/channel	1/unit	Seek Operations	
983,000	768,432	7.25 x 10 ⁶ bytes	1.0 x 10 ⁶ bytes	249 x 10 ⁶ bytes	Minimum	Number of Words per Unit
3,925,000	768,432	7.25 x 10 ⁶ bytes	1.0 x 10 ⁶ bytes	249 x 10 ⁶ bytes	Maximum	
173 x 10 ⁶ /ch.	7.90 x 10 ⁶ /ch.	116 x 10 ⁶ /trunk	16.4 x 10 ⁶ /trunk	3,984 x 10 ⁶ /trunk	Decimal Digits	Maximum Total Storage
94 x 10 ⁶ /ch.	4.55 x 10 ⁶ /ch.	58 x 10 ⁶ /trunk	8.2 x 10 ⁶ /trunk	1,992 x 10 ⁶ /trunk	Characters	
0	0	0	0	0	Minimum	Waiting Time, msec.
225	17.0	97.5	8.6	385	Average (Random)	
357	33.4	170	17.2	573	Maximum	
69,500	300,000	156,000	117,000	62,000	Effective Transfer Rate, char/sec.	
240 to 7,680	1 to 262,144	1 to 36,250	1 to 1,953	1,900 to 121,600	Transfer Load Size, char.	
Parity, check character	Parity	Cyclic check code	Parity	Parity	Checking	
Optional fast access feature uses fixed access arms	An adaptation of the UNIVAC FH-880 Drum	Changeable "Disk Packs" (IBM 2311 Disk Storage Drive)		Changeable cartridges hold 256 cards each	Features and Comments	
MT Series (7-track)	MT Series (9-track)	70/432	70/442	70/445	Model Number	
16/channel	16/channel	16/trunk	16/trunk	16/trunk	On-Line	Maximum Number of Units
1/channel	1/channel	1/channel	1/channel	1/channel	Reading/Writing	
0	0	0	0	0	Searching	
All	All	All	All	All	Rewinding	Demands on Processor, %
0.35 to 4.0	0.47 to 5.4	Varies	Varies	Varies	Reading/Writing	
0	0	Varies	Varies	Varies	Starting/Stopping	
26.9 to 120	28 to 160	30.0	60.0	120.0	Peak	Transfer Rate, Kilo-char/sec.
14.5 to 70	17.7 to 86.5	20.4	40.0	81.3	1,000-char blocks	
3.9 to 14.7	4.1 to 16.8	5.2	10.3	20.8	100-char blocks	
6	8	8 (6 with optional 7-Channel Tape Feature)			Data Tracks	
Variable	Variable	Variable			Data Rows per Block	
200,556 or 200,556,800	200,556 or 200,556,800	800 (200, 556, or 800 with 7-Channel Feature)			Data Rows per Inch	
Yes	No	Only when 7-Channel Tape Feature is installed			IBM 729 Compatible	
Track & row parity	Track & row parity	Track & row parity, cyclical redundancy			Reading	Checking
Read after write	Read after write	Read after write			Writing	
6 models, varying in tape speed and densities	6 models, varying in tape speed and densities	Dual-channel controllers are available; backward reading is standard; compatible with IBM 2400 Series Tape Units			Features and Comments	

AUXILIARY STORAGE

MAGNETIC TAPE

*With optional equipment.

System Identity			UNIVAC 418			
Computer System Report No.			790:			
AUXILIARY STORAGE	Model Number		FH-220	FH-330	FH-880	Fastrand II
	Type of Storage		Drum	Drum	Drum	Drum
	Maximum Number	Units On-Line	16	80	64	64
		Read/Write Operations	418-I: 8 418-II: 16	418-I: 2 418-II: 4	418-I: 1 418-II: 3	418-I: 1 418-II: 3
		Seek Operations	16	80	64	64
	Number of Words per Unit	Minimum	65,536	262,144	1,572,864	44,040,192
		Maximum	65,536	262,144	1,572,864	44,040,192
	Maximum Total Storage	Decimal Digits	5.56×10^6	111×10^6	534×10^6	$14,938 \times 10^6$
		Characters	3.15×10^6	63×10^6	302×10^6	$8,456 \times 10^6$
	Waiting Time, msec.	Minimum	0	0	0	0
		Average (Random)	8.5	8.5	17.0	92
		Maximum	17.0	17.0	33.4	155
	Effective Transfer Rate, char/sec.		23,000	90,000 max	180,000 max	158,000 max
	Transfer Load Size, char.		3 to 196,608	3 to 196,608	3 to 196,608	3 to 196,608
	Checking		Parity	Parity	Parity	Parity
	Features and Comments					Fastrand I is the same except for halved data capacity
MAGNETIC TAPE	Model Number		Uniservo II A	Uniservo III A	Uniservo IV C	Uniservo VI C
	Maximum Number of Units	On-Line	96	128	192	256
		Reading/Writing	8	418-I: 2 418-II: 5	418-I: 2 418-II: 4	418-I: 5 418-II: 11
		Searching	8	8	0	0
		Rewinding	All	All	All	All
	Demands on Processor, %	Reading/Writing	418-I: 8.0 418-II: 4.0	418-I: 40.0 418-II: 20.0	418-I: 48.4 418-II: 24.2	418-I: 18.4 418-II: 9.2
		Starting/Stopping	0	0	0	0
	Transfer Rate, Kilo- char/sec.	Peak	25.0	120.0	90.0	34.1
		1,000-char blocks	19.8	54.9	39.5	21.3
		100-char blocks	6.9	10.9	6.5	4.9
	Data Tracks		6	8	6	6
	Data Rows per Block		Variable	Variable	Variable	Variable
	Data Rows per Inch		125, 250	1,000	200,556,800	200,556,800
	IBM 729 Compatible		No	No	Yes	Yes
	Checking	Reading	Row parity	Row parity	Track & row parity	Track & row parity
		Writing	None	Read after write	Read after write	Read after write
	Features and Comments		Can read backward	Can read backward		

*With optional equipment.

